ATSDR

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

GULFCO MARINE MAINTENANCE
FREEPORT, BRAZORIA COUNTY, TEXAS
EPA FACILITY ID: TXD055144539
APRIL 19, 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

GULFCO MARINE MAINTENANCE

FREEPORT, BRAZORIA COUNTY, TEXAS

EPA FACILITY ID: TXD055144539

Prepared by:

Texas Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.

Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E60), Atlanta, GA 30333.

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Summary and Statement of Issues

The Gulfco Marine Maintenance (Gulfco) National Priorities List (NPL) site is a former barge cleaning facility located at 906 Marlin Avenue, Freeport, Brazoria County, Texas. The site is approximately three miles northeast of the city of Freeport and encompasses 40 acres on the Intracoastal Waterway. From 1971-1998, the facility was used as a barge cleaning and waste disposal facility. Barges brought to the facility were cleaned of waste oils, caustics, and organic chemicals and the wash waters generated during these operations were reportedly stored in three surface impoundments.

The Texas Department of Health (TDH) under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) reviewed available environmental information for Gulfco and evaluated the primary pathways through which it might be possible for people to come into contact with contaminants from the site. These exposure pathways include soil, sediment, groundwater, surface water, seafood, and air. Because of a lack of available data for the surface water, seafood, and air pathways, we have concluded that at this time the Gulfco Marine Maintenance site poses an indeterminate public health hazard.

Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR) was established under the mandate of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. This act, also known as the "Superfund" law, authorized the U.S. Environmental Protection Agency (EPA) to conduct clean-up activities at hazardous waste sites. EPA was directed to compile a list of sites considered hazardous to public health. This list is termed the National Priorities List (NPL). The 1986 Superfund Amendments and Reauthorization Act (SARA) directed ATSDR to prepare a Public Health Assessment (PHA) for each NPL site. (Note: Appendix A provides a listing of abbreviations and acronyms used in this report.)

In conducting the PHA, three types of information are used: environmental data, community health concerns and health outcome data. The environmental data are reviewed to determine whether people in the community might be exposed to hazardous materials from the NPL facility. If people are being exposed to these chemicals, ATSDR will determine whether the exposure is at levels that might cause harm. Community health concerns are collected to determine whether health concerns expressed by community members could be related to exposure to chemicals released from the facility. If the community raises concerns about specific diseases in the community, health outcome data (information from state and local databases or health care providers) can be used to address the community concerns. Also, if ATSDR finds that harmful exposures have occurred, health outcome data can be used to determine if illnesses are occurring which could be associated with the hazardous chemicals released from the NPL facility.

In accordance with the Interagency Cooperative Agreement between ATSDR and the Texas Department of Health (TDH), ATSDR and TDH have prepared this PHA for the Gulfco Marine Maintenance site. This PHA presents conclusions about whether exposures are occurring, and whether a health threat is present. In some cases, it is possible to determine whether exposures occurred in the past; however, often a lack of appropriate historical data makes it difficult to quantify past exposures. If it is found that a threat to public health exists, recommendations are made to stop or reduce the threat to public health.

Background

Site Description and History

The Gulfco Marine Maintenance (Gulfco) National Priorities List site is a former barge cleaning facility located at 906 Marlin Avenue, Freeport, Brazoria County, Texas. The site is approximately three miles northeast of the city of Freeport and encompasses 40 acres along the Intracoastal Waterway (Figure 1). The site is bordered to the north by marshland leading to Oyster Creek, to the south by the Intracoastal Waterway, to the east by the Exxon Mobil Offshore Oil Service, and to the west by the Bridge Harbor Yacht Club residential area. Portions of the site are on both sides of Marlin Avenue.

From 1971-1979, the Gulfco facility was used as a barge cleaning and waste disposal facility (Figure 2). Fish Engineering purchased the property in 1979 and continued barge cleaning operations until 1981. Barges brought to the facility were cleaned of waste oils, caustics, and organic chemicals. The wash waters generated during these operations were reportedly stored in three surface impoundments [2]. These surface impoundments are described in a July 15, 1980, U.S. Environmental Protection Agency Site Inspection Report as lined, earthen lagoons with a natural site clay layer [3]. The three impoundments had dimensions ranging from 145-317 feet long by 147-173 feet wide. No depths for the surface impoundments are indicated. In 1982, the impoundments reportedly were closed and covered with a hardwearing surface (Figure 3) [2].

In January 1989, Fish Engineering sold the majority of the former Gulfco property to Hercules Offshore Corporation that conducted barge cleaning and refurbishing operations at the facility until the company declared bankruptcy in May 1998 [4]. Waste wash waters generated during barge cleaning operations were stored in a rented floating barge or in aboveground storage tanks located on the facility (Figures 4 and 5) [5].

The barge slips and dry dock area where barges were emptied and repaired had no levees to contain potential contaminant migration. Dust from sandblasting activities reportedly settled on adjacent properties and in the Intracoastal Waterway [5]. The Texas Air Control Board issued a Notice of Violation to the company in 1989 for nuisance dust from the facility [2].

The Texas Commission on Environmental Quality (TCEQ), formerly known as the Texas Natural Resource Conservation Commission (TNRCC), conducted a Site Screening Inspection (SSI) in January 2000 and an Expanded Site Inspection (ESI) sampling event in January 2001. The purpose of these inspections was to assess potential site contaminant sources and evaluate threats to the surface water pathway [2].

Two waste source areas were identified during these inspections. The first, Source 1, consisted of contaminated soil associated with barge cleaning operations. The second, Source 2, consisted of three surface impoundments (buried/backfilled) north of Marlin Avenue (Figures 3, 4, and 5).

Potential contaminants associated with operational activities at Gulfco include fuel oil, oil wastes, gas condensate, alcohols, ketones, fertilizers, phenols, benzene, cyclohexane, urethane,

toluene, xylene, chloroethene, naphthalene, chloroform, creosote, tetrachloroethene, 1,1-dichloroethylene, 1,1,1-trichloroethane, dichloromethane, cumene, 1,1,2-trichloroethane, trichloroethane, acrylonitrile, ethyl ether, tetrachloromethane, formaldehyde, hydrochloric acid, calcium chloride, and others [2].

On May 30, 2002, Gulfco was proposed to the NPL, based on evidence that hazardous substances, including semi volatile organic compounds, lead, zinc, and pesticides, have migrated from the facility to the Intracoastal Waterway and may pose a threat to nearby drinking water supplies and downstream sensitive environments [1].

Land Use and Natural Resource Use

The Gulf Intracoastal Waterway borders the southern portion of the Gulfco site. The Intracoastal Waterway is a tidally influenced man-made canal that parallels the entire Texas Gulf Coast and is contiguous with numerous rivers and bays. In addition to being used for shipping, this water body is frequently used for recreational fishing and crabbing (Figure 6). Some of the water from the Intracoastal Waterway comes from Galveston Bay. Although, the TDH Seafood Safety Division has not sampled seafood from the Intracoastal Waterway, it has sampled Galveston Bay extensively and did not find any contaminants of public health concern [6]. The available sampling data could not be used to determine whether seafood samples from the Intracoastal Waterway near Gulfco are safe for people to eat.

There is an industrial offshore oil service less than one mile southwest of the site with workers on the site. There are no parks, recreational beaches, playgrounds, schools, hospital, day cares, or nursing homes within one mile of the site.

Areas of the Gulfco property north of Marlin Avenue drain to the northeast into an estuarine, persistently flooded wetland. These wetlands are directly adjacent to the Source 2 surface impoundments. The off-site drainage pathway from the Source 2 surface impoundments is northeast toward Oyster Creek (Figure 7).

Drinking water for the city of Freeport, which includes the residential area near the Gulfco site, is purchased from the Brazosport Water Authority and originates from the Brazos River.

Site Visit

On March 14, 2003, TDH staff visited the Gulfco Maintenance site. The site appeared to be abandoned and there was a chain across the driveway preventing vehicle access. The site was not fenced and pedestrians could gain access by stepping over the chain. Vegetation on the site was sparse with the groundcover consisting mainly of gravel and sand. A small two story metal building was on the site; it was posted with a small sign that read "Danger" (Figure 8). The most noticeable object that we saw on the site was a concrete pit filled with a dark sludgy liquid.

There were two slips, presumably to accommodate barges that were to be cleaned. There was a barge in one of the slips. We noted two vacant lots across the street also with chains across the driveways. Each of the lots contained a small concrete slab and sandy soil with tall vegetation.

On the basis of site descriptions, we concluded that these areas were the Source 2 former surface impoundments (Figure 3) [2].

There was what appeared to be an upper socio-economic status residential area with large estate type beach homes southwest of the site. There was a pier with a large yacht or yacht slip apparently owned by the homeowner in back of each home (Figure 9). We asked several of the homeowners questions about the Gulfco site; however, none of the homeowners with whom we spoke were aware of its presence. People were fishing and/or crabbing in the Intracoastal Waterway during the time of our site visit (Figure 6).

Demographics

The 2000 U.S. Census Bureau data reports 61 housing units and 63 residents within a ½ mile radius of the Gulfco site. There are 273 housing units and 266 people within a 1-mile radius of the site (Figure 1) [7]. The site is in Freeport, which has a population of approximately 12,814. There are no workers currently on the site.

Community Health Concerns

Community Concerns

In an effort to collect community health concerns, we contacted the Brazoria County Health Department (BCHD). The BCHD reported that, although there is general public concern regarding the numerous industrial facilities along the Intracoastal Waterway, they were not aware of specific health concerns regarding the Gulfco site.

In addition to contacting the local health department, we sent letters to 46 residents of the nearby Bridge Harbor residential area asking what concerns they might have about the site. We received several responses indicating an interest in the safety of seafood consumed from the Intracoastal Waterway, as well as a specific health concern about potential exposure to contaminants in the sediment. The specific health concerns included various types of cancers (bladder, colon, liver, lung, stomach, throat, and neck) and a type of degenerative muscular disease.

Health Outcome Data

Health outcome data (HOD) record certain health conditions that occur in populations. These data can provide information on the general health of communities living near a hazardous waste site. They can also provide information on patterns of specified health conditions. Some examples of health outcome databases are tumor registries, birth defects registries, and vital statistics. Information from local hospitals and other health care providers can also be used to investigate patterns of disease in a specific population. TDH and ATSDR look at appropriate and available health outcome data when there is a completed exposure pathway or community concern.

On the basis of the concerns expressed by several community members, TDH Cancer Registry Division investigated the occurrence of cancer in zip code 77541 (which includes the Bridge Harbor Subdivision). The Cancer Registry evaluated 1995-2000 incidence data (the most recent and best available data) and 1992-2001 mortality data for cancers of the stomach, colon, rectum, lung, bronchus, bladder, liver, intrahepatic bile duct, and esophagus. Incidence and mortality data for cancer of the lung and bronchus in females were statistically and significantly elevated. During the same time periods, incidence and mortality data for cancers of the stomach, colon, rectum, bladder, liver, intrahepatic bile duct, and esophagus were within the expected ranges for both males and females. We were not able to separate out the possible effects of smoking[1] on the elevated incidence of and mortality from lung and bronchus cancer in females [8].

DISCUSSION

Environmental Contamination, Pathways Analysis, and Public Health Implications

The presence of chemical contaminants in the environment does not always result in exposure to or contact with the chemicals. Because chemicals have the potential to cause adverse health effects only when people actually come into contact with them, it is exposure (the contact that people have with the contaminants) that drives the PHA process.

People can be exposed to contaminants by breathing, eating, drinking, or coming into direct contact with a substance containing the contaminant. This section reviews available information to determine whether people in the community have been, currently are, or could in the future be exposed to contaminants associated with this site.

To determine whether people are exposed to site-related contaminants, investigators evaluate the environmental and human components leading to human exposure. This analysis consists of evaluating the five elements of an exposure pathway:

- a source of contamination,
- transport through an environmental medium,
- a point of exposure,
- a route through which the contaminant can enter the body, and
- an exposed population.

Exposure pathways can be complete, potential, or eliminated. For a person to be exposed to a contaminant, the exposure pathway must be complete. An **exposure pathway** is considered complete when all five elements in the pathway are present and exposure has occurred, is occurring, or will occur in the future. A **potential pathway** is missing at least one of the five elements but could be complete in the future. An **eliminated pathway** is missing one or more elements and will never be completed. Table 1 identifies pathways important to this site. The following discussion incorporates only those pathways relevant and important to the site.

[1] According to the American Cancer Society, smoking accounts for 87% of all lung cancers.

Because exposure does not always result in adverse health effects, we also evaluate whether the exposure could be sufficient to pose a hazard to people in the community. The factors that influence whether exposure to a contaminant or contaminants could or would result in adverse health effects include:

(1) the toxicological properties of the contaminant;
(2) how much of the contaminant the individual is exposed to;
(3) how often or how long, or both, the exposure occurs;
(4) the manner in which the contaminant enters or contacts the body (breathing, eating, drinking, or skin/eye contact); and
(5) the number of contaminants to which an individual is exposed (combinations of contaminants).

Once exposure occurs, characteristics such as age, sex, nutritional status, genetics, lifestyle, and health status of the person influence how that person absorbs, distributes, metabolizes, and excretes the contaminant.

When identifying plausible potential exposure scenarios, the first step is assessing the potential public health significance of the exposure. This is done by comparing contaminant concentrations to health assessment comparison (HAC) values for both noncarcinogenic and carcinogenic end points. HAC values are media-specific contaminant concentrations used to screen contaminants for further evaluation. Although exceeding a HAC value does not necessarily mean that a contaminant represents a public health threat, it does suggest that the contaminant warrants further consideration.

Noncancer comparison values also are known as environmental media evaluation guides (EMEGs) or reference dose media evaluation guides (RMEGs) and are based on ATSDR's minimal risk levels (MRLs) and EPA's reference doses (RfDs), respectively. MRLs and RfDs are estimates of daily human exposure to a contaminant that is unlikely to cause adverse noncancer health effects over a lifetime. Cancer risk comparison values are also known as carcinogenic risk evaluation guides (CREGs) and are based on EPA's chemical-specific cancer slope factors and an estimated excess lifetime cancer risk of one-in-one-million persons exposed for a lifetime. Standard assumptions are used to calculate appropriate HAC values [9].

The environmental data used in this public health assessment were obtained from the 2001 TNRCC site screening inspection report [2]. Samples were available for groundwater, soil, and sediment. The samples were analyzed for volatile and semi-volatile organic compounds (VOCs and SVOCs), polychlorinated biphenyls (PCBs), pesticides, and metals. All samples were collected according to EPA-approved Quality Assurance Project Plans. Sample locations were approved by EPA prior to sample collection. The analysis and conclusions in this report are valid only if the referenced information is valid and complete.

Exposure Pathways

To assess the public health significance of this site, potential exposure to site contaminants in soil, sediment, groundwater, surface water, and seafood consumption were considered (Table 1). The pathways important to this site are presented below and in Table 1.

Soil

Three background soil samples and eight soil samples from the waste source areas were collected January 2000 at depths ranging from 0-6 inches (Table 2). Sample SO-6, taken from vacant lots 57 and 58 north of Marlin Avenue, contained benzo(a)pyrene at a level exceeding its CREG value. Although source samples and background samples contained arsenic at levels exceeding its CREG value, the reported concentrations were well within the range normally reported in soil from the Western United States [9].

In the past, on-site workers and trespassers could have come in contact with the contaminated soil. Using a reasonable maximum exposure scenario for workers[2], we estimate that there would be an estimated increased lifetime risk for cancer of $7x10^{-7}$ or approximately one in 1.5 million people. Qualitatively we interpret this as an insignificant increased risk for cancer. Currently, access to the site is not restricted. Although trespassing is possible, we would expect infrequent contact with the soil by trespassers to pose no apparent public health hazard.

Sediment

The TCEQ collected four background and four source sediment samples (Table 4). Although several compounds (phenanthrene, fluoranthene, pyrene, and bis-(2ethylhexyl)phthalate, heptachlor epoxide, chlordane, lead, and zinc) were detected at concentrations above background, all were reported at levels below their respective HAC values. Based on available information, exposure to contaminants in the sediment poses no apparent public health hazard.

Groundwater

In January 2001, the TCEQ collected two background samples, four source groundwater samples, and one duplicate groundwater sample from four temporary monitor wells on each of the four sides of the surface impoundment (Table 5). Each well was completed to a total depth of approximately 20 feet with a 10 foot slotted screen installed in the lower half of each well [2].

Source groundwater samples contained numerous volatile and semi-volatile organic compounds and inorganic contaminants at levels above their respective HAC values (Table 6). One background sample contained arsenic, nickel, and vanadium at levels above their respective HAC values (Table 6). HAC values for groundwater are based on drinking water standards for a person consuming two liters of water from the source per day. Since there is no evidence that the groundwater is being used for potable purposes, contaminants in the groundwater do not pose a public health hazard.

[2] Based on a worker ingesting 50 mg of soil, containing the maximum reported concentrations of arsenic and benzo(a)pyrene, per day, 250 days per year, for 30 years.

Surface Water

Surface water sampling data were not available for evaluation. The topography of the property is relatively flat [10]. Drainage for the southern part of the property is toward the Intracoastal Waterway. The shortest distance from Source 1 (the contaminated soil) to the Intracoastal Waterway is less than 10 feet (Figure 10). Areas of the Gulfco property north of Marlin Avenue drain to the northeast into an estuarine wetland. These wetlands are directly adjacent to the Source 2 (surface impoundments) (Figure 7). In general, surface water can migrate in all directions within contiguous surface water bodies since these surface water bodies are tidally influenced [2]. Due to a lack of data, exposure to the surface water pathway has been categorized as an indeterminate public health hazard.

Seafood Consumption

People fish and crab within the Intracoastal Waterway near the Gulfco site. Both fish and crabs are taken for consumption. Because edible tissue samples from fish and crab taken from the Intracoastal Waterway were not available for evaluation, this pathway is an indeterminate public health hazard.

Air

Air sampling data from historical air releases at the Gulfco site were not available for review. However, the barge cleaning operations at the facility included sandblasting. In 1992, Hercules Offshore Corporation used 5,000 tons of standard blasting sand. By 1994, the company had switched to an abrasive blasting grit; the estimated amount used was 3,350 tons per year. The fraction of airborne material generated by sandblasting at the facility was calculated at approximately 8 tons per year until 1996, when sandblasting was eliminated [2].

TDH received several anecdotal reports from the community that while the facility was operating a fine, gritty sand would coat household surfaces. Odors were noticed when the barges were being cleaned. However, due to the lack of historical air sampling data, we were not able to assess this potential pathway of exposure to site contaminants. Therefore, TDH/ATSDR has classified the air pathway in the past as posing an indeterminate public health hazard.

Because sandblasting and barge cleaning are no longer occurring at the site, the levels of releases are likely much lower than in the past; however no data is available to confirm this, so TDH/ATSDR have determined that currently the air pathway is an indeterminate health hazard.

Children's Health Considerations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of their water, soil, air, or food. Children are at greater risk than are adults from certain kinds of exposures to hazardous substances emitted from waste sites and emergency events. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than an adult, which means they breathe dust, soil, and heavy vapors close to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, housing decision, and access to medical care. Although some contaminants in soil and groundwater exceed their respective health-based comparison values for children, exposure to these contaminants would not occur or would not be frequent enough to pose a public health hazard. As with adults, exposure to seafood, surface water, or the air pathway could not be evaluated.

Conclusions

- On the basis of available information, contaminants in soil and sediment pose no apparent public health hazard either because contaminants are at low concentrations or exposure would be too infrequent to result in adverse health effects.

- Because there is no evidence of exposure to groundwater, the groundwater pathway does not pose a public health hazard.

- Because of a lack of data, we were not able to evaluate the surface water, seafood consumption, or air pathways; thus, we have classified these pathways and the overall site as posing an indeterminate public health hazard.

Public Health Action Plan

Actions Planned

TCEQ/EPA plan to proceed with the remedial investigation of the site.

Actions Recommended

- Post warning signs to limit possible trespassing.
- Collect and analyze seafood samples from the Intracoastal Waterway for site contaminants.
- TDH and ATSDR should evaluate seafood sampling data collected from the Intracoastal Waterway.

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Certification

This public health assessment was prepared by the Texas Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Public Health Assessment and concurs with its findings.

Chief, State Programs Section, SSAB, DHAC, ATSDR

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Appendices

APPENDIX A: Acronyms and Abbreviations

APPENDIX B: Figures

APPENDIX C: Tables

APPENDIX A- Acronyms and Abbreviations

ACRONYMS AND ABBREVIATIONS

ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 980
CREG	Carcinogenic Risk Evaluation Guide
EMEG	Environmental Media Evaluation Guide
EPA	Environmental Protection Agency
ESI	Expanded Site Inspection
HAC	Health Assessment Comparison Value
MRL	Minimal Risk Level
NPL	National Priorities List
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PHA	Public Health Assessment
RfD	Reference Dose
RMEG	Reference Dose Media Evaluation Guide
SARA	Superfund Amendments and Reauthorization Act of 1986
SSI	Screening Site Inspection
SVOCs	Semi-Volatile Organic Compounds
TCEQ	Texas Commission on Environmental Quality
TDH	Texas Department of Health
TNRCC	Texas Natural Resource Conservation Commission
VOCs	Volatile Organic Compounds

Appendix B - TABLES

Table 1. Evaluation of Potential Exposure Pathways for Gulfco Marine Maintenance

PATHWAY NAME	*PRIMARY CONTAMINANTS OF CONCERN*	*EXPOSURE PATHWAY ELEMENTS*					*TIME*	*CONCLUSIONS*
		Source	*Transport Media*	*Point of Exposure*	*Route of Exposure*	*Exposed Population*		
Potential Exposure Pathways								
Soil	*Benzo(a)pyrene*	*wastewater discharge from local industry / site operations*	*Soil*	*On-site*	*Incidental ingestion, Dermal contact*	*Trespassers Workers*	*Past Present Future*	**No apparent public health hazard** *sufficient evidence indicates that people would not be exposed to contaminants in the soil at sufficient concentrations and often enough to present a public health concern*
Sediment	*Present but below health based screening values*	*wastewater discharge from local industry / site operations*	*Sediment*	*Off-site,*	*Incidental ingestion Dermal contact*	*Workers Residents*	*Past Present Future*	**No apparent public health hazard** *sufficient evidence indicates that people would not be likely to come in contact with sediment at sufficient concentrations or often enough to present a public health concern*
Groundwater	*Volatile organics, Semi-volatile organics, metals*	*wastewater discharge from local industry / site operations*	*Groundwater*	*None*	*None*	*None*	*NA*	**No public health hazard** *Based on available information, there is no evidence of exposure*
Surface water	*No data*	*wastewater discharge from local industry / site operations*	*Surface water*	*Off-site*	*Incidental ingestion, Dermal contact*	*Workers Residents*	*Past Present Future*	**Indeterminate public health hazard** *Lack of data*
Biota (seafood)	*No data*	*wastewater discharge from local industry / site operations*	*Fish and crabs*	*Off-site*	*Ingestion*	*Residents*	*Past Present Future*	**Indeterminate public health hazard** *due to lack of biota sampling data*
Air	*No data*	*wastewater discharge from local industry / site operations*	*Air*	*On-site Off-site*	*Inhalation*	*Area residents Workers*	*Past Present*	**Indeterminate public health hazard** *due to lack of air sampling data*

Table 2. Soil Sample Location Descriptions for Gulfco Marine Maintenance Collected January 2000 at 0-6 inches Depth	
	Sample Location
Background Samples (composites)	
SO-09	Approx. 0.8 mile NE of Gulfco, on N side of Marlin Ave.
SO-10	Approx. 0.5 mile NNW of Gulfco in undeveloped wetland area
SO-11	duplicate of SO-10
Source Samples (composites)	
SO-01	sandblasting area adjacent to barge slip 1
SO-02	sandblasting area northeast of quonset building
SO-03	former drum storage area
SO-04	former wash water storage area
SO-05	Above Ground Storage Tank (AST) tank farm area
SO-06	vacant lots 57 and 58 N of Marlin Ave.
SO-07	adjacent to former surface impoundment
SO-08	adjacent to former surface impoundment

[1]Only those samples with detectable levels of contaminants were listed, all other samples had non-detectable levels of contaminants. Health based comparison values are based on an assumed ingestion rate of 200 milligrams (mg) of soil for children (body weight 10 kilograms (kg) and an ingestion rate of 100 mg of soil for adults (body weight 70 kg).

Table 3. Soil Sample Constituents[1] Exceeding HAC Values (µg/g)[2] at Gulfco Marine Maintenance During the 2000 TCEQ Screening Site Inspection			
Contaminant	SO-06	SO-01-SO-11	Health Assessment Comparison Value (µg/g)[2]
Sample Results			
benzo(a)pyrene	2.6	ND[3]	0.1 CREG[4]
arsenic	ND	1.5 - 6.3	0.5 CREG

[1]Only those samples with detectable levels of contaminants were listed, all other samples had non-detectable levels of contaminants. Health based comparison values are based on an assumed ingestion rate of 200 milligrams (mg) of soil for children (body weight 10 kilograms (kg) and an ingestion rate of 100 mg of soil for adults (body weight 70 kg).
[2]µg/g=micrograms per gram
[3] non-detectable
[4]CREG=cancer risk evaluation guide and is based on an excess cancer risk of one in one-million persons exposed over a lifetime

Table 4. Sediment Sample Location Descriptions for Gulfco Marine Maintenance Collected January 2000	
	Sample Location
Background Samples (composites)	
SE-01	Intracoastal waterway east of PPE and the confluence of Oyster Creek
SE-02	duplicate of SE-02
SE-05	Intracoastal waterway west of PPE and the confluence of the Old Brazos River Channel
SE-15	Intracoastal waterway east of PPE and the confluence of Oyster Creek
Source Samples (grab sample)	
SE-08	Barge slip 1
SE-09	Barge slip 2
SE-10	East of Barge slip 2
SE-11	East of Barge slip 2

Table 5. Groundwater Sample Location Descriptions for Gulfco Marine Maintenance Collected January 2000	
	Sample Location
Background samples	
GW-10	Temporary monitoring well approximately 0.6 mile southwest (SW) of the Gulfco facility (total depth 20', screened interval 10-20')
GW-11	Temporary monitor well approximately 0.34 mile NE of the Gulfco facility (total depth 20', screened interval 10-20')
Source Samples (taken from monitoring wells in surface impoundments, source 2)	
GW-01	North side of the former surface impoundments at the toe of the surface impoundment cap (total depth 20', screened interval 10-20')
GW-02	East side of the former surface impoundments at the toe of the surface impoundment cap (total depth 24', screened interval 14-24')
GW-03	West side of the former surface impoundments at the toe of the surface impoundment cap (total depth 24', screened interval 14-24')
GW-04	South side of the former surface impoundments at the toe of the surface impoundment cap (total depth 20', screened interval 10-20')
GW-05	Duplicate groundwater sample of GW-01

Table 6. Groundwater Sample Constituents Exceeding HAC Values (µg/L)[1] at Gulfco Marine Maintenance During the 2000 TCEQ Screening Site Inspection[2]

Contaminant	GW-01	GW-02	GW-03	GW-04	GW-05	GW-11[3]	Health Assessment Comparison Value (µg/L)
Sample Results							
Volatile Organics (µg/L)							
Vinyl chloride	nd[4]	nd	nd	17,000	nd	nd	0.03 CREG[5] 2 MCL[6] 0.2 child/ 0.7 adult EMEG[7] 30 child/100 adult RMEG[8]
1,1 Dichloroethene	nd	nd	nd	nd	30,000	nd	90 child/300 adult EMEG 500 child/2,000 adult RMEG 7 MCL
Methylene chloride	nd	670,000	nd	77,000	nd	nd	600 child/2,000 adult EMEG/RMEG
1,1,1-Trichloroethane	nd	nd	nd	93,000	83,000	nd	200 LTHA; 200 MCL
Benzene	nd	nd	nd	nd	16,000	nd	0.6 CREG; 5 MCL
1.2-Dichloroethane	nd	99,000	nd	nd	9,700	nd	0.4 CREG; 5 MCL 2,000 child/7,000 adult int. EMEG
1,1,2-Trichloroethane	46	nd	nd	35	nd	nd	0.6 CREG; 3 LTHA; 5 MCL 40 child/100 adult RMEG
1,1,2,2-Tetrachloroethane	16	nd	nd	nd	nd	nd	0.2 CREG; 0.3 LTHA[9]
Semi-volatile Organics							
Naphthalene	nd	nd	nd	230	nd	nd	200 child/700 adult RMEG 100 LTHA
Heptachlor	0.17	nd	nd	nd	nd	nd	0.008 CREG; 0.4 MCL
Inorganics							
Arsenic	77.7	10.2	42.6	nd	70.6	10.2	3 child/10 adult EMEG/RMEG 0.02 CREG; 10 MCL
Manganese	8,460	2,010	14,100	nd	8,660	nd	500 child/2,000 adult RMEG
Nickel	217	nd	nd	nd	216	46.8	2 CREG; 100 LTHA 200 child/700 adult RMEG
Vanadium	196	53.7	nd	nd	178	64.9	30 child/100 adult int. EMEG

[1] µg/L=micrograms per liter
[2]Only those samples with detectable levels of contaminants were listed, all other samples had non-detectable levels of contaminants. Health based comparison values are based on an assumed ingestion rate of 2 liters of water for adults (body weight 70 kilograms) and an ingestion rate of 1liter of water for children (body weight 10 kg).
[3] background sample
[4] non-detectable
[5]CREG=cancer risk evaluation guide and is based on an excess cancer risk of one in one-million persons exposed over a lifetime
[6]MCL = maximum contaminant level for drinking water
[7]EMEG=environmental media evaluation guide and is based on ATSDR's MRL for chronic exposure
[8]RMEG=reference dose media evaluation guide and is based on EPA's RfD for chronic exposure (unless otherwise specified)
[9]LTHA = lifetime health advisory for drinking water

APPENDIX C – Figures

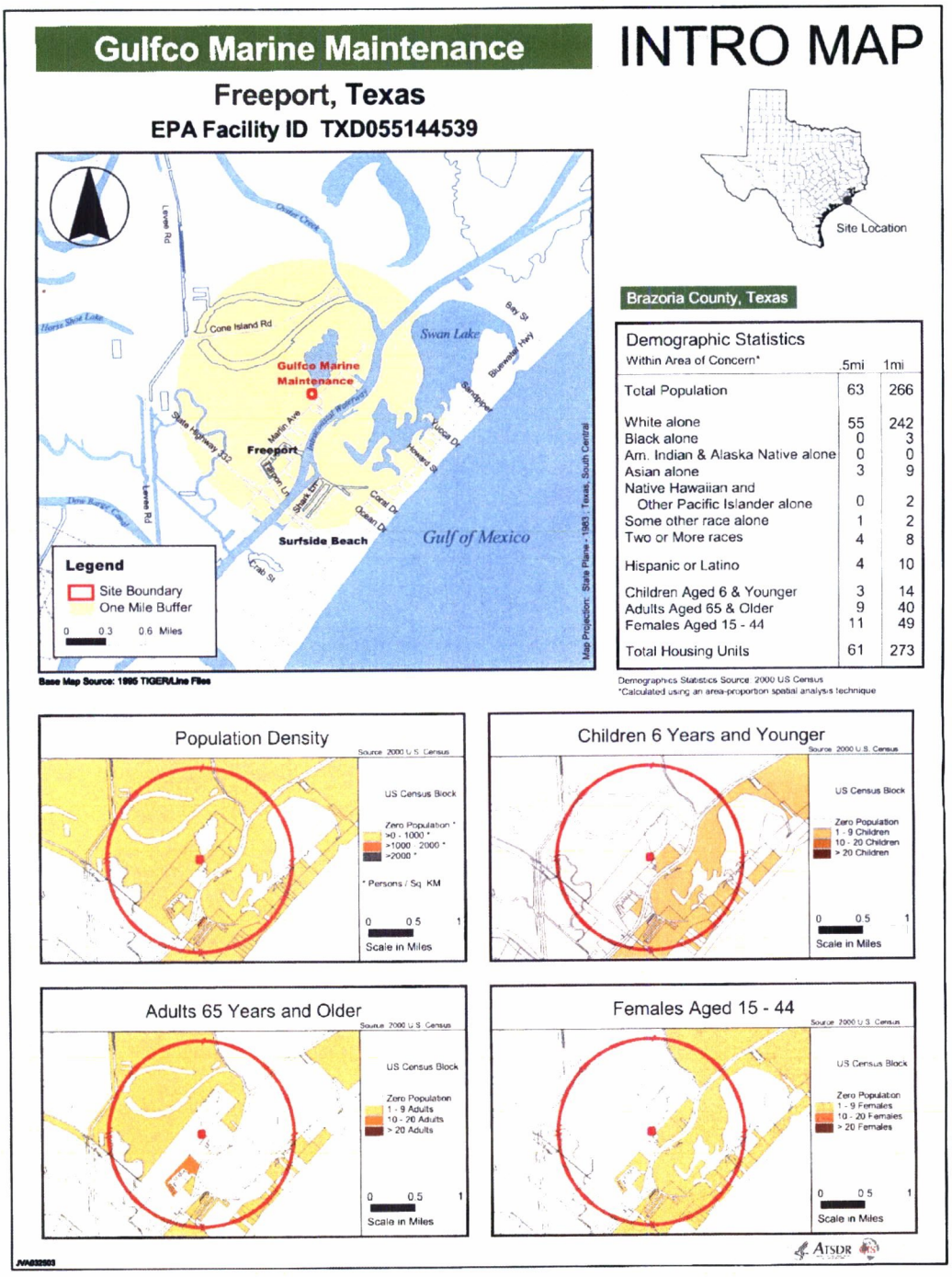

Figure 1. Demographics and Map

Figure 2. Barge slip adjacent to site (southwest side) showing proximity of residential area in far background

Figure 3. Vacant lot across Marlin Ave. north of site (PPE 2)

Figure 4. North side of Gulfco site along Marlin

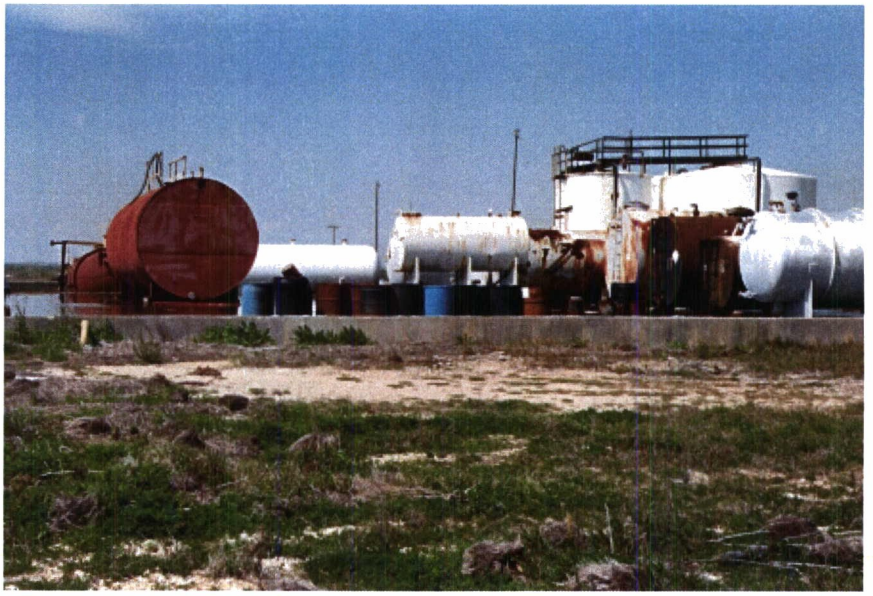

Figure 5. South end of Gulfco site along the Intracoastal Waterway showing storage drums and tanks

Figure 6. Fishers along shore of Intracoastal Waterway

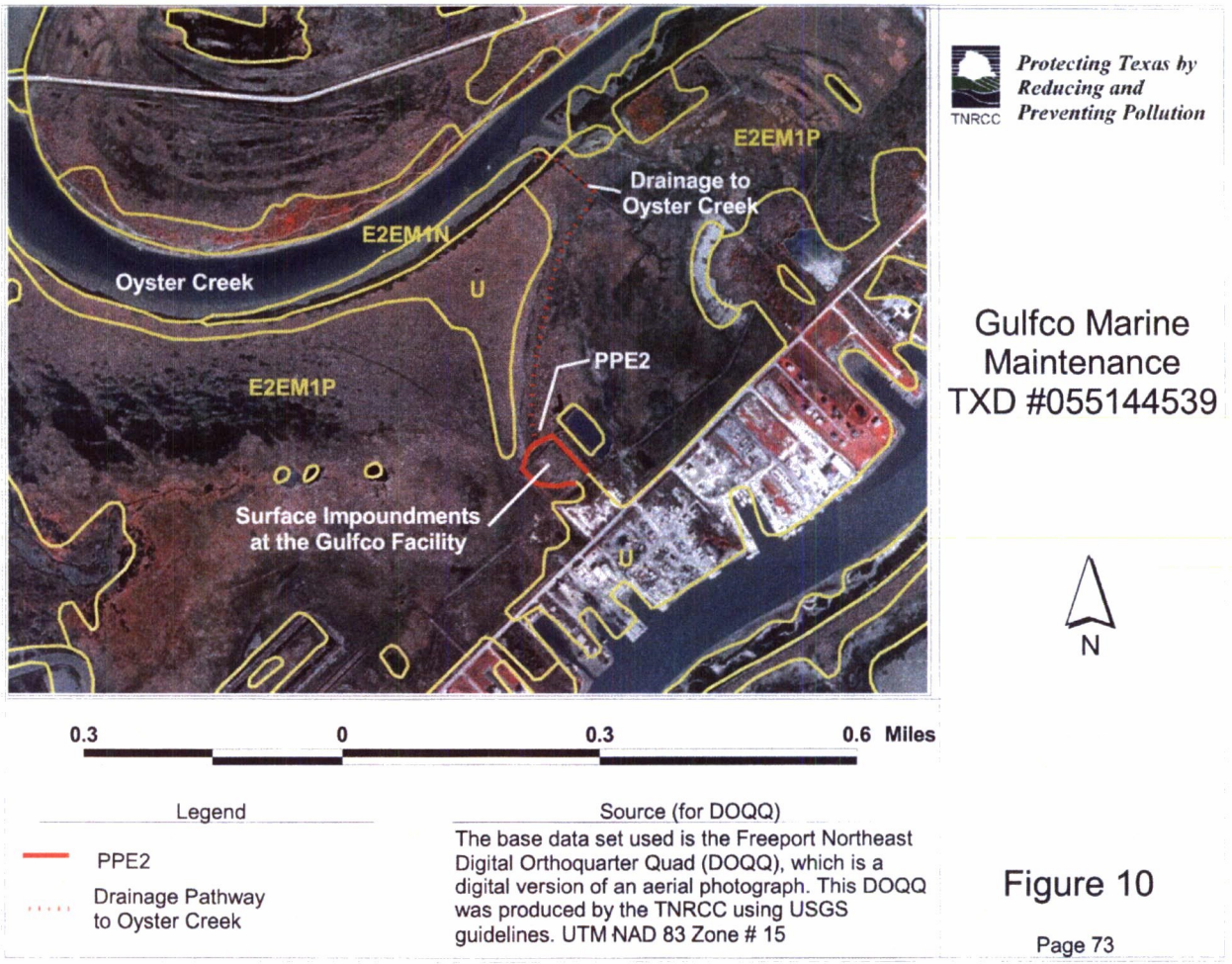

Figure 7. Probable point of entry 2 to Oyster Creek

Figure 8. Tin building on site

Figure 9. Upper class residential area in Bridge Harbor Yacht Club

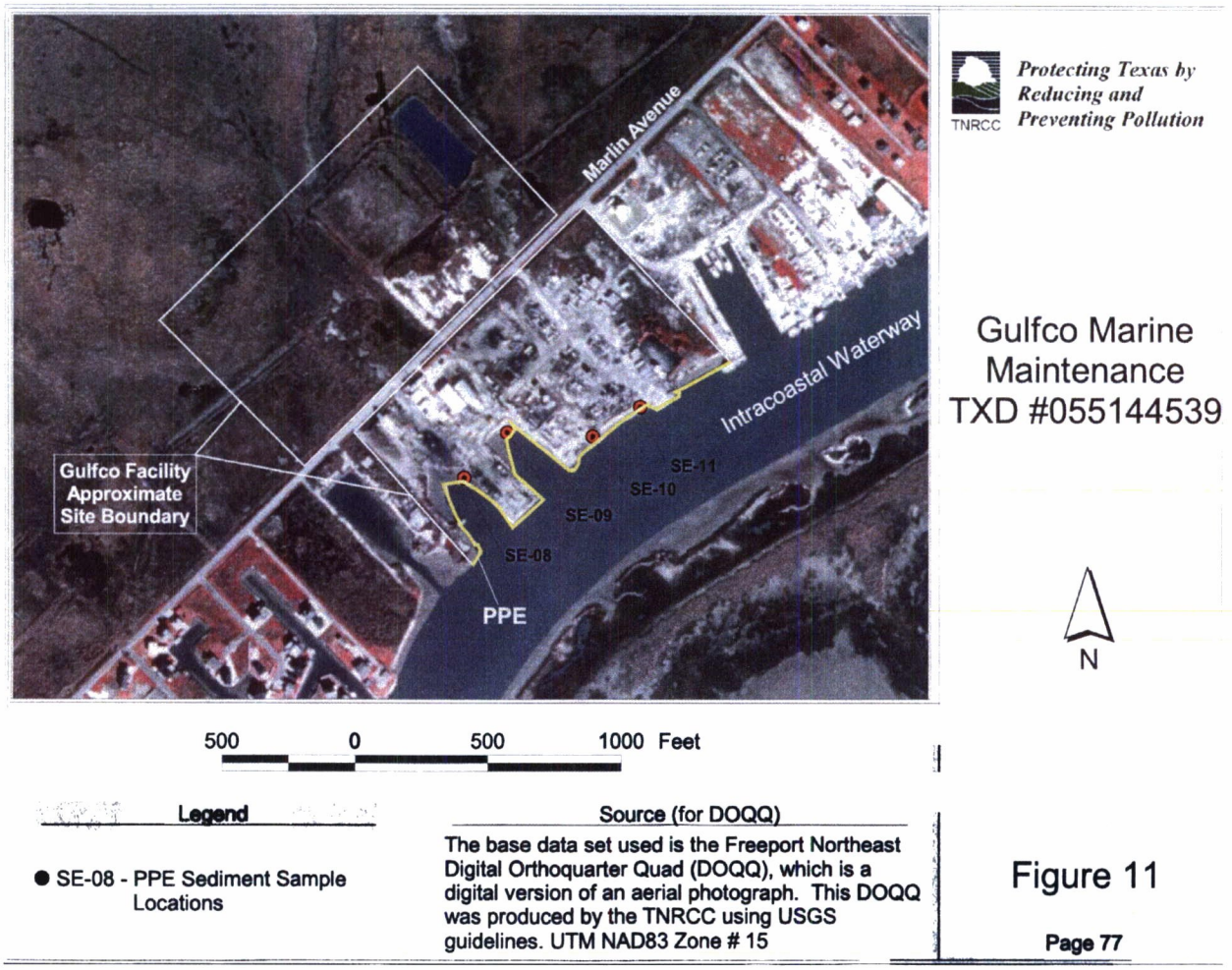

Figure 10. Probable point of entry 1